

REMARKS

Claims 52 through 54 are currently pending in the application.

This amendment is in response to the Office Action mailed on April 24, 2002.

Applicants note the filing of an Information Disclosure Statement herein on January 24, 2002 and note that a copy of the PTO-1449 was not returned with the outstanding Office Action. Applicants respectfully request that the information cited on the PTO-1449 be made of record herein.

Applicants submit herewith, under cover of a separate Letter to the Chief Draftsman, proposed corrections to FIG. 13D of the drawings. All proposed corrections have been marked in red. Applicants respectfully request approval of the corrections to the drawings. Applicants are filing concurrently herewith corrected formal drawing FIG. 13D.

In accordance with the Examiner's objection, the title has been amended to be more descriptive.

In accordance with the Examiner's objection, the Abstract has been amended to be more descriptive.

In accordance with the Examiner's request, Applicants are providing copies of the references listed on the Information Disclosure Statement previously filed November 6, 2000 along with a courtesy copy of the Information Disclosure Statement previously filed November 6, 2000.

Claims 52 and 54 were rejected under 35 U.S.C. § 102(b) as being anticipated by Solomon (United States Patent 5,067,233, hereinafter "Solomon").

Claim 53 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Solomon.

After carefully considering the cited prior art, the rejections, and the Examiner's comments, Applicants have amended the claimed invention to clearly distinguish over the cited prior art and respectfully request reconsideration of the above-referenced application.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on Solomon

Claims 52 and 54 were rejected under 35 U.S.C. § 102(b) as being anticipated by Solomon. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants submit that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Solomon relates to integrated circuit modules and, more particularly, to integrated circuit modules suitable for supporting arrays of infrared detector elements in a space environment. Layers 11 are each formed to have a beveled edge 15, wherein said edge is formed by anisotropically etching single crystalline silicon. A separate contact board 13 is formed to have a beveled edge 17 shaped to mate with the beveled edge 15 at a complementary angle to edge 15. Contact board 13 is formed to include a plurality of conductive pads 21 formed on the beveled surfaces 17. The layers 11 are formed to include conductive pads 23 which are in abutting electrical connection with contact board pads 21. The layer conductive pads 23 are in electrical communication with conductive pattern 25 formed on a first surface of layer 11. The conductive pattern 25 communicates signals from the conductive pad 23 to integrated circuit structure 27 formed in the surface of layer 11. The contact board 13 is also provided with a plurality of conductive pads 29 formed on the second surface of the contact board. The conductive pads 29 preferably form an area array on the lower surface of the contact board 13. The electrical communication between pads 21 and conductive pads 29 is effected by a conductive via 31 extending through the contact board 13 formed by vapor deposition of a through hole in the contact board 13.

Applicants respectfully submit that presently amended independent claim 52 is not anticipated by Solomon because each and every element as set forth therein is not found, either expressly or inherently described, therein. In particular, among other recited elements, the subject matter of “forming a contact body from a semiconductive material configured to be electrically conductive” recited in claim 52 is not found, either expressly or inherently described,

in Solomon. Applicants respectfully point out that the electrical communication between conductive pads in Solomon is effected by metal-filled conductive vies formed by vapor deposition of a through hole in the contact board and not by a semiconductor material configured to be electrically conductive. Additionally, claim 54, is allowable among other reasons, as depending either directly or indirectly from claim 52, which is allowable.

Therefore, Applicants respectfully request that the anticipation rejection under 35 U.S.C. § 102(b) of claims 52 and 54 be withdrawn.

35 U.S.C. § 103(a) Obviousness Rejections

(A) Applicable Authority

The basic requirements of a *prima facie* case of obviousness are summarized in MPEP §2143 through §2143.03, *i.e.*, in order “to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success in combining the references. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the expectation of success must both be found in the prior art, and not based on Applicants' disclosure.” *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Further, in establishing a *prima facie* case of obviousness the initial burden is placed on the examiner. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). See also MPEP § 706.02(j) and § 2142.

The Supreme Court has established the standard of patentability to be applied in obviousness rejections in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). This standard has been summarized in MPEP § 2141 into four factual inquiries including “(A) determining of the scope and contents of the prior art; (B) ascertaining the differences between

the prior art and the claims in issue; (C) resolving the level of ordinary skill in the pertinent art; and (D) evaluating evidence of secondary considerations.” It should be noted that, when applying the required patentability standards of *Graham*, the basic considerations which apply to obviousness rejections based on 35 U.S.C. § 103 should include the following principles of patent law: “(A) the claimed invention must be considered as a whole; (B) the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) reasonable expectation of success is the standard with which obviousness is determined.” *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

(B) Obviousness Rejection Based on Solomon

Claim 53 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Solomon. Applicants respectfully submit that Solomon does not support a *prima facie* case of obviousness of the instant invention because Solomon does not teach all of the limitations of the invention claimed therein, *Vaeck*, supra.

Claim 53 is dependent from independent claim 52. Solomon is relied on as anticipating the subject matter of independent claim 52, and then Solomon is relied on as making obvious the additional subject matter of claim 53 under 35 U.S.C. § 103.

As set forth above with respect to claim 52, Solomon fails to teach or suggest all the claim limitations of claim 52, which are incorporated by way of dependency in claims 53. Specifically, Solomon fails to either disclose, describe, teach or suggest the formation of a socket contact by joining a contact head made of a conductive material with a contact body made of a semiconductive material configured to be electrically conductive. Solomon teaches electrical communication between metal surfaces by way of metal-filled conductive vias formed by vapor deposition of a through hole in the contact board (See FIGS. 2A, 2B, 3A, and 3B of Solomon). Therefore Solomon cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Solomon does not teach all of the limitations recited in claim 52.

Serial No. 09/652,585

Claim 53 is allowable, among other reasons, as depending either directly or indirectly from claim 52, which is allowable. Therefore, Applicants submit that claim 53 is allowable over Solomon. Applicants request reconsideration and allowance of claim 53.

Applicants respectfully request the allowance of claims 52 through 54 and the case passed for issue.

Respectfully submitted,



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JRD/sls:djp

Enclosure: Version with Markings to Show Changes Made

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APPENDIX A

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

Please change the title to:

PROCESS OF FORMING SOCKET CONTACTS

IN THE ABSTRACT:

Please amend the abstract as follows:

In a socket used to house semiconductor die during testing, a recessed socket contact and methods of making the same [is] are provided that avoid[s] pinching the die's contacts. Also provided are socket contacts and methods of making the same that allow for smaller socket holes and, therefore, denser arrays of socket contacts. In one embodiment, the body of the socket contact comprises a head, a spring coupled to the head, and a shaft coupled to the spring; no outer shell is needed for the spring, as the non-conductive sides of the socket hole serve that function. In another embodiment, the body of the socket contact comprises a metal shaft having an aperture. Compression causes the shaft to close around the slit, thereby decreasing the amount of lateral buckling. In yet another embodiment, semiconductor fabrication techniques are used to construct a dense array of contacts.

IN THE SPECIFICATION:

A marked-up version of the amended paragraphs in the specification, highlighting the changes thereto, follows to clearly identify the amendments:

Please replace the second full paragraph on page 4 with the following:

Accordingly, the current invention provides electrical contacts as well as methods for forming them. One preferred embodiment comprises a contact as part of a socket used for testing a semiconductor die, wherein the contact has a head that defines a recess, and the head is coupled to an elongated conductive body configured to fit within a socket. More specifically, the head comprises a portion defining the perimeter of the head, with other portions of the head lower than the perimeter. In one exemplary embodiment, this head takes the form of a planar ring with a sidewall sloping downward from the ring toward the central axis running the length of the contact. This sidewall transitions to a generally planar section that is parallel to, yet lower than, the perimeter ring. Various preferred embodiments address varying degrees of transition and planarity of the portions of the contact head.

Please replace the first full paragraph on page 10 with the following:

As stated above, the electrical contact head may be associated with an electrical contact body that is already known in the art. In the context of socket contacts, for example, Figure 8 illustrates the socket contact head 38 as part of a pogo pin 46. The socket contact head 38 is connected to, if not an integral part of, an outer shell 48. The socket contact head 38 is also connected to an inner shaft 50 through a spring 52. However, if the outer shell 48 is made of an electrically conductive material, then the entire shell 48 is available to receive current, when all that is really needed is for current to travel from the head 38 to the shaft 50 through the spring 52 (as well as in the reverse direction). In addition, the hole 30 must be wide enough to accommodate the diameter of the shell 48. As technology allows for small chip contacts 28 that may then be more closely packed together, it is desirable to densify the socket holes 30 in a corresponding manner. The additional width needed for the outer shell 48 runs counter to that desire.

Please replace the first full paragraph on page 11 with the following:

Another electrical contact body that is known in the art is the buckle beam, and the current invention includes electrical contact heads such as the ones described above attached to

such a body. However, to avoid the problems associated with buckle beams, the current invention also includes within its scope embodiments such as the one in Figure 10, wherein a socket contact [1032] 1132 comprises a socket contact head 38 and a tube 60 having at least one aperture 62. Thus, when a compressive force is applied to the socket contact [1032] 1132, at least some of that force will cause the tube 60 to collapse in on itself, initiating the closure of the aperture 62, rather than cause the tube 60 to buckle laterally. Thus, hole 30 need not be as large as when it accommodates buckle beams. The tube is nevertheless resilient enough to generally return to its pre-compression shape once the compressive force eases. Further, the tube 60 is configured to fit snugly against the socket body 24 somewhere along its length. Other embodiments have a plurality of apertures, such as Figure 11, wherein two apertures, 62 and 64, appear at the same depth but on different sides of the tube 60. Figure 12A depicts two apertures, 62 and 66, at different depths along the tube 60. The tube 60 in these and other embodiments are preferably made of metal such as gold, copper, beryllium copper, or stainless steel. The aperture or apertures can be formed by sawing. In addition, since it is also preferred to make the socket contact head from metal, it is possible to form the head 38 and tube 60 from the same piece of metal.

Please replace the paragraph bridging pages 15 and 16 with the following:

One skilled in the art can appreciate that, although specific embodiments of this invention have been described for purposes of illustration, various modifications can be made without departing from the spirit and scope of the invention. For example, just as embodiments concerning a socket contact head may be associated with prior art socket contact bodies, so too can embodiments of socket bodies be used in conjunction with prior art socket heads. Moreover, concerning embodiments involving the testing of electronic devices, the devices and methods covered by the current invention could be used in tests including burn-in, connectivity checks, open short tests, and multichip module tests, as well as others. As for embodiments addressing [what] which IC chips could be tested, the current invention includes embodiments that involve testing packages such as dual in-line (DIP), zig-zag in-line (ZIP), leadless chip carrier (LCC), small outline package (SOP), thin small outline package (TSOP), quad flat pack (QFP), small outline j-bend (SOJ), and pin grid array (PGA) packages in addition to the bare die, chip scale package, flip chip, BGA, and LGA mentioned above. Moreover, the methods and devices

Serial No. 09/652,585

described above are not limited to testing circumstances; rather, they could also be used for interconnect devices in permanent or semi-permanent packaging. Accordingly, the invention is not limited except as stated in the claims.

IN THE CLAIMS:

A marked-up version of each of the presently amended claims, highlighting the changes thereto, follows:

52. (Amended) A socket contact formation process, comprising:
forming a contact head from a conductive material;
forming a contact body from a semiconductive material configured to be electrically
conductive; and
joining said contact head and said contact body.